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PART II

# DEPARTMENT OF TRANSPORTATION

## Coast Guard

# VENTILATION SYSTEMS ON BOATS

## Proposed Minimum Safety Standards

[4910-14]

## DEPARTMENT OF TRANSPORTATION

**Coast Guard**

**[33 CFR Parts 175, 183]**

**[46 CFR Part 25]**

[CGD 76-082]

## VENTILATION OF BOATS

**Proposed Minimum Safety Standards**

AGENCY: Coast Guard, DOT.

ACTION: Proposed rule.

SUMMARY: This notice proposes regulations that apply to boats having gasoline powered engines for propulsion or electrical generation. Gasoline vapors collecting in the boat have caused explosions and fires that have resulted in personal injuries, property damage and death. The Coast Guard believes that these proposed minimum safety standards for ventilation systems, together with the present standards for fuel and electrical systems will significantly reduce the probability of gasoline vapors collecting in the boat where they can be easily ignited, causing a fire or explosion.

DATES: Comments must be received on or before September 25, 1978.

ADDRESSES: Comments should be submitted to Commandant (G-CMC/81), (CGD 76-082), U.S. Coast Guard, Washington, D.C. 20590. Comments will be available for examination at the Marine Safety Council (G-CMC/81), Room 8117, Department of Transportation, Nassif Building, 400 Seventh Street SW., Washington, D.C. 20590.

FOR FURTHER INFORMATION CONTACT:

Captain George K. Greiner, Marine Safety Council (G-CMC/81), Room 8117, Department of Transportation, Nassif Building, 400 Seventh Street SW., Washington, D.C. 20590, 202-426-1477.

SUPPLEMENTARY INFORMATION: Interested persons are invited to participate in this proposed rulemaking by submitting written views, data, or arguments. Each person submitting a comment should include name and address, identify this notice (CGD 76-082) and the specific section of the proposal to which the comment applies, and give the reasons for the comment. The proposal may be changed in light of comments received. All comments received will be considered before final action is taken on the proposal. Copies of all written comments received will be available for examination by interested persons. No public hearing is planned but one may be held at a time and place to be set in a later notice in the FEDERAL REGISTER if requested in writing by an interested person raising a genuine issue and desiring to comment orally at a public hearing.

### DRAFTING INFORMATION

The principal persons involved in drafting this proposal are: Lars E. Granholm, Project Manager, Office of Boating Safety and Lt. William R. Kerivan, Project Attorney, Office of the Chief Counsel. Lt. G. S. Karavitis, Office of the Chief Counsel has relieved Lt. Kerivan as Project Attorney.

### BACKGROUND

On March 15, 1977, the Coast Guard published an advance notice of proposed rulemaking for power ventilation on boats. Interested persons were invited to submit their comments to the Coast Guard. All these comments were carefully considered in the preparation of this proposed rulemaking.

Copies of these comments are available for examination by interested persons in Room 8117, Department of Transportation, Nassif Building, 400 Seventh Street SW., Washington, D.C. 20590.

Specific comments were requested on the following areas:

*Applicability.* The comments indicate that regulations should be applied to outboard as well as inboard boats. These comments were accepted. The regulations in this proposal would apply to all boats with gasoline engines. Comments also suggest that powered ventilation should be required in engine compartments and natural ventilation in any compartment where gasoline vapor could be present. The Coast Guard agrees that ventilation should always be provided in engine compartment and fuel tank compartments where gasoline vapors are present. This proposal would require both powered and natural ventilation systems to be used in compartments that have a permanently installed gasoline engine. Only natural ventilation systems would be required for fuel tank compartments.

Some commenters suggested that ventilation should not be required in fuel tank compartments where the fuel tank vents to the outside of the boat since the accumulation of fuel vapors in the compartment is improbable. The Coast Guard agrees, as long as any electrical component in the fuel tank compartment is ignition protected. The electrical component must be ignition protected in order to limit the probability of an explosion in the event of a gasoline leak.

*Ventilation systems.* The comments received favor a performance requirement for ventilation. This proposed rule includes performance specifications for both powered and natural ventilation systems. The Coast Guard believes that the proposed specifications would insure an airflow in compartments that will reduce vapor concentration sufficiently to prevent an explosion. The Coast Guard asked if any interlock should be required to prevent the engine ignition system from being energized before the power ventilation system is energized. Several commenters were against this proposal because it could cause confusion when a boat has to be started quickly in an emergency. Some commenters also mentioned that an interlock could be costly. Consonant with Coast Guard policy to impose the minimum requirements necessary to achieve an adequate level of safety, this proposal does not require interlocks on ignition systems. Further comments are desired on whether or not interlocks should be required.

The commenters agreed with the formula that the Coast Guard suggested for the sizes of openings for ducts and openings for natural ventilation. The formula appears in § 183.615(d) of this proposal.

Many commenters felt that canvas campertops should be considered as open compartments and not be required to have ventilation because they are not airtight. The Coast Guard agrees. These tops have to be opened prior to entering the boat and at that time any gasoline vapors could be detected. The commenters agreed with the previously used definition that 15 square inches of open area for each cubic foot of net compartment volume is adequate for a compartment to be considered open, so as not to need additional ventilation.

*Economic and environmental impact.* This proposal has been reviewed under DOT Notice 78-1 "Improving Government Regulations" (43 FR 9582). A draft evaluation has been prepared and is available for inspection at the Office of the Executive Secretary, Marine Safety Council. This review has shown this to be a nonmajor proposal with no environmental impact.

The National Boating Safety Advisory Council (NBSAC) has been consulted, in meetings open to the public, concerning this proposal. The opinion and advice of the Council has been considered in the formulation of this proposed regulation.

On December 13, 1977, the Council unanimously agreed with the proposals contained in the Notice of proposed rulemaking. The transcript of this meeting is available for examination in Room 424, U.S. Coast Guard Headquarters, Trans Point Building, 2100 Second Street SW., Washington, D.C.

### Discussion of the Proposed Regulations

The proposed regulations require a powered ventilation system and a natural ventilation system. The powered ventilation system is intended for use prior to starting the engine to discharge gasoline vapors. The natural ventilation system is to dilute or remove gasoline vapors which may collect in the bilges while the boat is out of use for extended periods and also to remove gasoline vapors while the boat is underway.

Section 183.605 contains definitions. Compartments which are "open to the atmosphere" have at least 15 square inches of open area for each cubic foot of net compartment volume. The Coast Guard believes gasoline vapors would dissipate from a compartment meeting this standard without additional ventilation.

Section 183.610(a) requires that each compartment having a permanently installed gasoline engine be equipped with an exhaust blower. The Coast Guard believes that the reduction of gasoline vapor concentrations by a blower will drastically reduce the risk of explosions. Excepted from this requirement is an engine without an electric cranking motor for starting. The Coast Guard believes these boats should be excluded because they usually are started by a hand crank on the engine. This method of starting requires the engine cover or box to be removed. The presence of gasoline vapors could then be detected by the operator.

Section 183.610(b) specifies that the blower required must be rated for a stated minimum capacity by the methods prescribed by Air Moving & Conditioning Association or Underwriters Laboratories. The required blower rating is determined by formulas in table 1 of §183.610 based on the net engineroom volume.

Section 183.610(c) specifies a minimum airflow in the blower outlet ducts. This is to assure that the blower ducts are not arranged in a manner which restricts the blower capacity.

Section 183.610(d) specifies that the blower duct must originate in the lower part of the engine compartment because gasoline vapors collect in this part as they are heavier than air. The requirement that the duct be above the normal level of accumulated bilge water is to preclude the accumulated water from blocking off the duct inlet so as to prevent the blower from discharging gasoline vapors.

Section 183.610(f) requires each boat to have a label advising that the blower must be run for at least 4 minutes prior to starting the engine, and that the operator must inspect the engineroom for the presence of gasoline vapors. This is to assure that the engineroom is free of gasoline vapors which could ignite when the operator attempts to start the engine. Further comments are desired as to whether there is a need for additional requirements in regard to posting, display, color, size, location, and content of the warning.

Section 183.615 prescribes that to obtain efficient natural ventilation a compartment must have minimum size supply and exhaust openings, and that they must be spaced a distance apart in the compartment as required by this section. This assures that any localized gasoline vapor concentration can be diluted by the airflow and dispersed from the compartment before the gasoline vapors reach an explosive level.

Section 183.615(e)(2) specifies that when the compartment volume is established for determining the size of the supply and exhaust openings or ducts, that volume is the sum of the volumes of all compartments that have a common nautral ventilation arrangement. This assures that if a series of compartments are ventilated by common supplies and exhausts the opening sizes are based on the combined compartment volumes.

Section 183.620 specifies that a natural ventilation system is required in compartments not open to the atmosphere that have either an engine, a permanently installed gasoline tank with electrical components that are not ignition protected, a fuel system where the permeability of the fuel tank exceeds a certain amount, or a fuel tank which vents into that compartment. An engine, a permeable fuel tank or a fuel tank vent frequently discharge fuel vapors which can create an explosive vapor concentration. The natural ventilation system would dissipate the fuel vapors and greatly reduce the risk of an explosion.

Section 183.620(a) specifies that the natural ventilation system must be arranged so an airflow of 6 miles per hour or less, simulating the wind over the bow, insures a movement of air in the compartments so that air flows out through the exhaust ducts. This is to insure continuous dissipation of any vapors that may accumulate.

Section 183.620(b)(2) requires natural ventilation in a compartment that is adjacent to another compartment which requires ventilation if the bulkhead or the cross sectional area between the compartments has openings of more than 2 percent of the area. If the openings between the compartments are less than 2 percent, the Coast Guard believes the gasoline vapors will be confined in the compartment where they originate so that ventilation is not needed in the adjacent compartment.

Section 183.620(b)(3) required natural ventilation where a fuel tank is installed in a compartment containing an electrical component that is not ignition protected. This requirement is necessary because a leak in the fuel system coupled with a spark from an electrical component could cause an explosion.

Section 183.620(b) (4) and (5) specify that compartments with fuel tanks that are constructed so they can emit gasoline vapors must be ventilated. These vapors could escape into other compartments where they could be ignited causing an explosion. Test procedures and guidelines for determining the permeablity rate are currently under development by the Coast Guard and will be made available to the public as soon as they are ready.

A new Subpart C—Ventilation—is proposed to be added to 33 CFR 175—Equipment Requirements. This subpart specifies that an operator of a boat must maintain the powered and natural ventilation systems as required in Subpart K of Part 183. This subpart also allows an operator to use a boat without a natural ventilation system in a fuel tank compartment if the fuel tank compartment has ignition protected electrical components and the fuel tank does not vent into that compartment.

Two new paragraphs are proposed to be added to 46 CFR 25.40-1 in order to harmonize the existing ventilation regulations with the proposed requirements for manufactuers and operators. Presently, an operator requirement in 46 CFR, Subpart 25.40 requires cowls and ventilator ducts to be used to remove explosive gases from the bilges of every engine and fuel tank compartment. That requirement will be superseded by proposed Subpart C of 33 CFR Part 175 for boats (as defined in the Federal Boat Safety Act of 1971) built after July 31, 1979.

Operators of boats built after July 31, 1978, will not be required to comply with the requirements for fuel tank compartment ventilation in paragraph 25.40-1(a) if there is not an electrical source of ignition in the fuel tank compartment and if the fuel tank vents to the outside of the boat. This will permit manufacturers to begin building boats which comply with the proposed Subpart K of Part 183 1 year earlier than the proposed effective date.

### Authority

This amendment is proposd under authority of the Federal Boat Safety Act of 1971 (46 U.S.C. 1454). The authority vested in the Secretary of the Department of Transportation by the act is delegated to the Commandant of the Coast Guard at 49 CFR 1.46(n)(1).

In consideration of the foregoing, it is proposed to amend Part 183 of Title 33, Part 175 of Title 33, and Part 24 of Title 46 of the Code of Federal Regulations as follows:

1. By adding a new Subpart K to 33 CFR 183 to read as follows:

**Subpart K—Ventilation**

Sec.
183.601 Applicability.
183.605 Definitions.
183.610 Powered ventilation system.
183.615 Natural ventilation—General.
183.620 Natural ventilation system requirements.

AUTHORITY: Federal Boat Safety Act of 1971 (46 U.S.C. 1454).

**Subpart K—Ventilation.**

**§ 183.601** *Applicability.*

(a) This subpart applies to all boats that—

(1) Have gasoline engines for electrical generation, mechanical power, or propulsion, and

(2) Are built after July 31, 1979, except that a manufacturer may elect to comply with this subpart at any time after July 1, 1978 and prior to August 1, 1979.

**§ 183.605 Definitions.**

(a) As used in this subpart—

"AMCA" means Air Moving and Conditioning Association. The Coast Guard incorporates by reference AMCA Standard 210-74, dated 1974 in § 186.610(b). This incorporation by reference was approved by the Director of the Office of the Federal Register on March 24, 1978. The incorporated standard is available for inspection at Coast Guard Headquarters, Room 4314, Trans Point Building, 2100 2d Street SW., Washington, D.C. 20590 and at the Office of the Federal Register library, Room 8401, 1100 L Street NW., Washington, D.C. 20408. The incorporated standard may be obtained from Air Moving and Conditioning Association, 30 West University Drive, Arlington Heights, IL 60004.

"ASTM" means American Society for Testing and Materials. The Coast Guard incorporated by reference ASTM Standard D-471 dated April 1975, in § 183.520(b)(5). This incorporation by reference was approved by the Director of the Office of the Federal Register on September 20, 1976. The incorporated standard is available for inspection at Coast Guard Headquarters, Room 4314, Trans Point Building, 2100 Second Street SW., Washington, D.C. 20590 and at the Office of the Federal Register Library, Room 8401, 1100 L Street NW., Washington, D.C. 20408. The incorporated standard may be obtained from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

"Fuel" means gasoline.

"Open to the atmosphere" means a compartment that has at least 15 square inches of open area directly exposed to the atmosphere for each cubic foot of net compartment volume.

"UL" means Underwriters Laboratories, Inc. The Coast Guard incorporates by reference UL Standard 1128, dated August 23, 1977, in § 183.610(b). This incorporation by reference was approved by the Director of the Office of the Federal Register on March 24, 1978. The incorporated standard is available for inspection at Coast Guard Headquarters, Room 4314, Trans Point Building, 2100 2nd Street SW., Washington, D.C. 20590 and at the Office of the Federal Register Library, Room 8401, 1100 L Street NW., Washington, D.C. 20408. The incorporated standard may be obtained from Underwriters Laboratories, Inc., 207 Ohio Street, Chicago, IL 60611.

**§ 183.610 Powered ventilation system.**

(a) Each compartment that has a permanently installed gasoline engine with a cranking motor must—

(1) Be open to the atmosphere, or

(2) Be ventilated by an exhaust blower system.

(b) Each exhaust blower must be rated at an air flow capacity not less than that computed by the formulas given in Table 1, Column 2. Blower rating must be determined according to AMCA Standard 210-74 dated 1974, or UL Standard 1128 dated August 23, 1977.

TABLE 1

| Column 1 | Column 2 | Column 3 |
|---|---|---|
| Net compartment volume of engine compartment and compartments open thereto (V) cubic feet | Rated blower capacity (Fr) cubic feet per minute | Blower system output (Fo) cubic feet per minute |
| Below 34 | Fr=50 | Fo=20 |
| 34 to 100 | Fr=1.5V | Fo=0.6V |
| Over 100 | Fr=V/2+100 | Fo=0.2V+40 |

(c) Each exhaust blower system required by paragraph (a)(2) of this section must exhaust air from the boat at a rate which meets the requirements of Table 1, Column 3 when the engine is not operating.

(d) Each intake duct opening for an exhaust blower must be in the lower one-third of the compartment and above the normal level of accumulated bilge water.

(e) More than one exhaust blower may be used in combination to meet the requirements of this section.

(f) Each boat that is required to have an exhaust blower system must have a label that—

(1) Is located as close as practicable to the ignition switch,

(2) Is in plain view of the operator; and

(3) Has at least the following information:

CAUTION

GASOLINE VAPORS CAN EXPLODE

OPERATE BLOWER FOR 4 MINUTES AND CHECK ENGINE

COMPARTMENT BILGE FOR GASOLINE VAPORS

BEFORE STARTING ENGINE.

**§ 183.615 Natural ventilation—General.**

(a) For the purpose of § 183.620, "Natural Ventilation" means an airflow in a compartment achieved by having a—

(1) Supply opening or duct from the atmosphere or from a compartment that is open to the atmosphere, and

(2) An exhaust opening into another ventilated compartment, or an exhaust duct to the atmosphere.

(b) The distance between each supply opening or duct and any exhaust opening or duct within the compartment must be at least 70 percent of the longest dimension of the compartment.

(c) Each exhaust opening or duct must originate in the lower third of the compartment.

(d) Each supply opening or duct and each exhaust opening or duct in a compartment must be above the normal accumulation of bilge water.

(e) Except as provided in paragraph (f) of this section, the minimum aggregate internal cross-sectional area of the supply openings or ducts and of the exhaust openings or ducts must be not less than the value calculated as follows:

$$A=5\ \ln(V/5)$$; where;

(1) A is the minimum aggregate internal cross-sectional area of the openings or ducts in square inches;

(2) V is the net compartment volume in cubic feet, including the net volume of other compartments sharing the same ventilation systems; and

(3) ln (V/5) is the natural logarithm of the quantity (V/5).

(f) The minimum internal cross-sectional area of each supply opening or

duct and exhaust opening or duct must exceed 3.0 square inches.

(g) The minimum internal cross-sectional area of terminal fittings for flexible ventilation ducts installed to meet the requirements of paragraph (e) of this section must not be less than 80 percent of the required internal cross-sectional area of the flexible ventilation duct.

**§ 183.620 Natural ventilation system requirements.**

(a) Each natural ventilation system must be constructed so that air will exit through each exhaust opening or duct when the boat is in a wind or airflow of 6 miles per hour or less flowing from bow to stern when the engine is not operating.

(b) Except for compartments open to the atmosphere, a natural ventilation system that meets the requirements of § 183.615 must be provided for each compartment that—

(1) Contains a permanently installed gasoline engine;

(2) Has openings between it and a compartment that requires ventilation, where the aggregate area of those openings exceeds 2 percent of the area between the compartments, except as provided in paragraph (c) of this section;

(3) Contains a permanently installed fuel tank and an electrical component that is not ignition protected in accordance with paragraph 183.410(a), Subpart I;

(4) Contains a fuel tank that vents into that compartment; or

(5) Contains fuel system components with an aggregate permeability rate of more than 1.2 grams of fuel loss in 24 hours for each cubic foot of net compartment volume at 40° C. Reference fuel "C" from ASTM standard D-471, dated April 1975, is to be used in determining the permeability rate.

(c) An accommodation compartment above a compartment requiring ventilation that is separated from the compartment requiring ventilation by a deck or other structure is excepted from paragraph (b)(2) of this section.

2. By adding a new Subpart C to 33 CFR Part 175 to read as follows:

**Subpart C—Ventilation**

**§ 175.31 Ventilation.**

(a) No person may operate a boat built after July 31, 1979, that has a gasoline engine for electrical generation, mechanical power, or propulsion unless it is equipped with an operable ventilation system that meets the requirements of 33 CFR 183.610(a) and 183.620(b).

3. By amending 46 CFR 25.40-1 to read as follows:

**§ 25.40-1 Tank and engine spaces.**

(a) All motorboats or motor vessels, except open boats and as provided in paragraph (d) and (e) of this section, the construction or decking over of which is commenced after April 25, 1940, and which use fuel having a flashpoint of 110° F, or less, shall have at least two ventilator ducts, fitted with cowls or their equivalent, for the efficient removal of explosive or flammable gases from the bilges of every engine and fuel tank compartment. There shall be as least one exhaust duct installed so as to extend from the open atmosphere to the lower portion of the bilge and at least one intake duct installed so as to extend to a point at least midway to the bilge or at least below the level of the carburetor air intake. The cowls shall be located and trimmed for maximum effectiveness and in such a manner so as to prevent displaced fumes from being recirculated.

(b) As used in this section, the term "open boats" means those motorboats or motor vessels with all engine and fuel tank compartments, and other spaces to which explosive or flammable gases and vapors from these compartments may flow, open to the atmosphere and so arranged as to prevent the entrapment of such gases and vapors within the vessel.

(c) Where alterations are needed for existing motorboats or motor vessels to comply with the requirements in this section, such alterations shall be accomplished as soon as practicable but in any case shall be completed by June 1, 1966.

(d) Boats as defined in the Federal Boat Safety Act of 1971 built after July 31, 1979, or which are in compliance with 33 CFR Part 183 are excepted from these requirements.

(e) Boats as defined in the Federal Boat Safety Act of 1971 built after July 31, 1978 are excepted from the requirements of paragraph (a) for fuel tank compartments that—

(1) comply with the requirements of 33 CFR 183.410(a); and

(2) contain fuel tanks that vent to the outside of the boat.

NOTE.—The Coast Guard has determined that this document does not contain a major proposal requiring preparation of an Economic Impact Statement under Executive Order 11821, as amended, and OMB Circular A-107.

Dated: July 18, 1978.

R. H. SCARBOROUGH,
*Vice Admiral, U.S. Coast Guard,*
*Acting Commandant.*

[FR Doc. 78-25014 Filed 7-26-78; 8:45 am]